



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

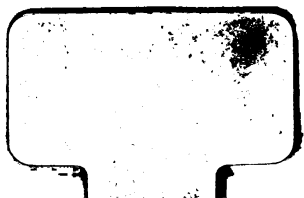
We also ask that you:

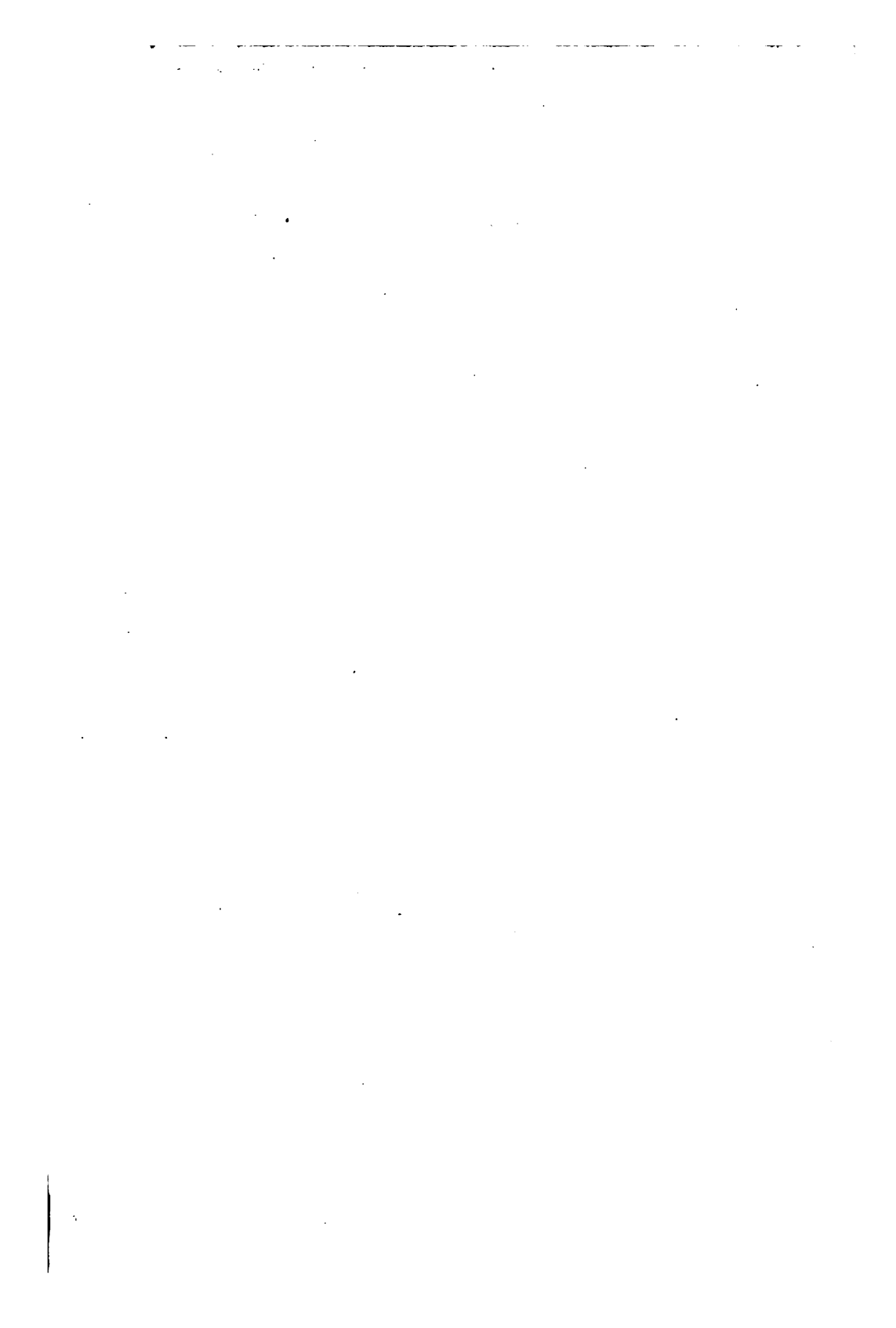
- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

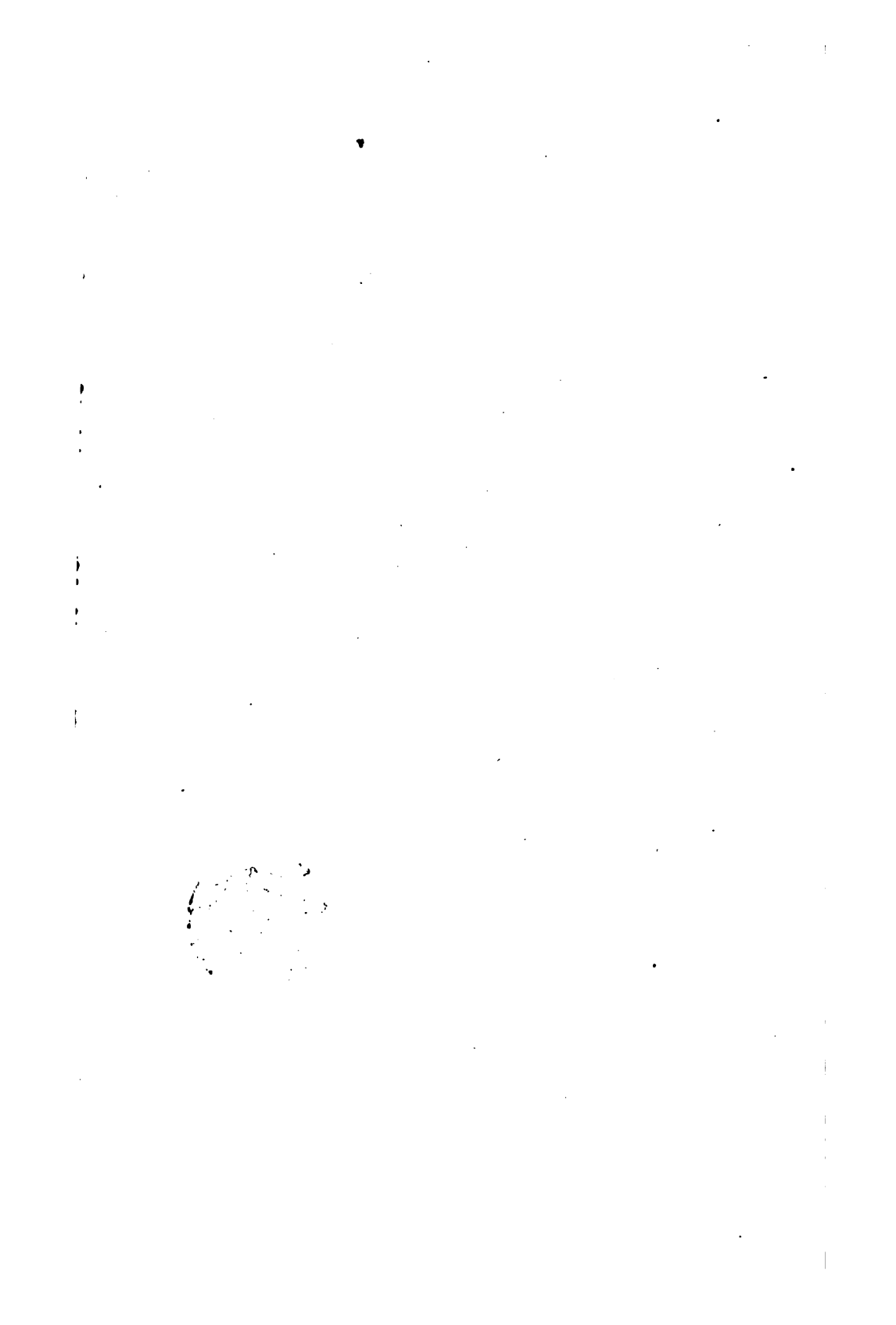
About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

DE MAN
ON
BEET ROOT SUGAR





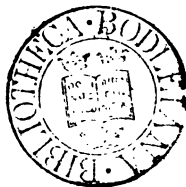


THE
"BEET ROOT SUGAR"
QUESTION.

BY
E. F. DE MAN,
Belgian Agriculturist,
&c., &c., &c.

"Beet Root Sugar is destined to play a great part in the industrial and commercial world."—THE EDITOR.

SECOND EDITION.



LONDON:
WILLIAM RIDGWAY, 169, PICCADILLY. W.
1871.

Price Three Skillings and Sixpence.

191. i. 37*

PREFACE.

AT this eventful period of European History, when men's minds are so intensely agitated by the horrors of War, and so much distracted by the apprehension of commercial vicissitudes, it would be difficult indeed to bring the reasoning faculties to bear upon the peaceable and profitable pursuits of introducing important branches of modern Agriculture, and Manufacture. But when those turbulent influences shall have ceased—when the horrifying and all absorbing subject of carnage, destruction of property, ruin, and devastation, shall no longer exist, and appal the civilized world—when, in fine, the calm and holy blessing of peace, shall under God's high providence, once more proclaim their hallowed presence amongst us, and men's thoughts shall have calmed down to the sober consideration of their own individual interest, then, it will be wise for Capitalists (whose attention has been hitherto so much absorbed by manufacturing enterprise) to turn their eyes to an undeveloped source of abundant wealth, in this country—as set forth in the following pages, devoted to the subject of home produced Sugar.

There certainly now exists no longer any doubt in the minds of practical men of the desirability of turning to the most profitable account, many

millions of acres of waste land of the United Kingdom, by means of the cultivation of Beet Root, as a staple for the produce of Sugar, of a quality vastly superior to that which is now ordinarily consumed.

It was with this object in view, that, on the memorable and deplorable day (the 15th of July) when France declared war against Prussia, I sat down to commence my work of bringing before the public, a Pamphlet, treating on the cultivation of Beet Root, and its manufacture into Sugar. I had already some months previously, in letters to the "Times" and "Telegraph" deplored and opposed the emigration scheme, as being calculated to drain from us the flower of manhood, the very pith and marrow of our male population. I pointed out, instead of such an exodus being beneficial to the country, it was ruinous in many points of view; for without supposing for a moment, that such a contingency should arise as might render it necessary to preserve the blood and bone of the country as a supply for the army—Europe being at that time in apparent tranquillity—yet, having regard to Agriculture, to Manufacture, and our Commercial interests, it was indeed a sad mistake to encourage the whole outpouring *en masse* of so prime a portion of our population. What! England with her immense capital and resources, not capable of finding remunerative employment for a few thousand of her willing-hearted stalwart sons!

Are we so thrift of expedients for the employment of labour—is the Government so parsimonious—that nothing can be done to prevent such a catastrophe? are there no new and modern branches of industry which can be introduced into this country, and which would at once supply the means of employment to thousands who are presumed to be compelled to emigrate as a dernier resort?

The answer is “Yes, undoubtedly.”

The science of Agriculture it has been said is, comparatively speaking, yet in its infancy; and the culture of the Beet Root, and its manufacture into Sugar, is unquestionably *one* of the very many means by which profitable industry might be promoted, and that to an extent that can only be known and justly appreciated, when it shall be discovered how so great a scope for remunerative industry has been neglected.

CONTENTS.

	PAGE
INTRODUCTION	5
CHAPTER I.	
Statistics of the Imports of Sugar in the United Kingdom	9
CHAPTER II.	
The different Effects of Cane Sugar and Beet Root Sugar upon our organs	14
CHAPTER III.	
Controversial Arguments and realised Facts in favour of Beet Root Sugar	20
CHAPTER IV.	
To Cultivate and Manufacture Beet Root Sugar with great advantage, it should be conducted on a large scale	25
CHAPTER V.	
The Modes in which Beet Root Sugar is sold in Belgium to the Manufacturers	29
CHAPTER VI.	
Experiments with the Beet Root and other Vegetable Plants.—Linseed Oil, and other liquids, powerful stimulants to grow the Beet Root Plant to an extraordinary size	34
CHAPTER VII.	
Soil and Climate of Flanders, with reference to the Culture of Beet Root Sugar in the United Kingdom ; also a Word on Cane Sugar	39

	PAGE
CHAPTER VIII.	
The best Soil to grow Beet Root Sugar	42
CHAPTER IX.	
Great Britain and Ireland well suited for the Culture of Beet Root Sugar ; also a word on Country Life	46
CHAPTER X.	
Land Rents in Belgium	54
CHAPTER XI.	
Investment of Capital in the Beet Root Sugar industry	61
CHAPTER XII.	
Social and Moral Benefits derived from the Beet Root Sugar industry	65
CHAPTER XIII.	
The introduction of the Beet Root Sugar industry will check Emigration	67
CHAPTER XIV.	
Land Rents of the United Kingdom, together with other advantages in favour of the Beet Root Sugar industry	69
CHAPTER XV.	
Selection of Seed to grow Beet Root Sugar	71
CHAPTER XVI.	
Transplantation of the Beet Root Plant	76
APPENDIX	83

INTRODUCTION.

As my Pamphlet treats only on the Culture of "the Beet Root Sugar," it may perhaps not be out of place to say a word on the history of Agriculture.

Improvements in Agriculture, were already fully appreciated by the ancients ; not only was that all-important question supported by the philosophers of that epoch, but most all the great military men of the Roman Empire applied themselves to the study, and practice of Agriculture. Amongst others, mention is made of Quintius Cincinnatus, who delivered the Roman army when besieged by the Æqui ; Caius Fabricius, who conquered the Samnites, and many other military celebrities were Agriculturists.

Agriculture, in the hands of such men, was soon brought to some perfection ; and, according to Pliny, Rome became, during his time, the emporium of abundance in Agricultural productions. Yet, the husbandmen of antiquity, as well as those of the middle ages, were destitute of the many advantages employed by the modern cultivator ; neither the practical nor the theoretical Agriculturist of those periods had any correct idea of Geology, Mineralogy and Chemistry, Botany, Vegetable Physiology, or Natural Philosophy. Those sciences have given the modern Agriculturist the command of important agent elements, of all which the

ancients had but a very imperfect notion. If Agriculture had already made some steps towards perfection by the ancients, what should Agriculture be in our days?

After the middle ages, for several centuries the study of the soil has been neglected, and consequently, progress in Agriculture has been stationary—or even has retrograded; and the author does not hesitate in stating that, notwithstanding all the Scientific aid which has come to the support of Agriculture during the last forty years, Agriculture is still in its infancy.

Advancing such arguments may be somewhat discouraging to those who have applied themselves of late years to the study of Scientific Agriculture: but such remarks should precisely make the reverse impression, and be the stimulant for further Scientific researches.

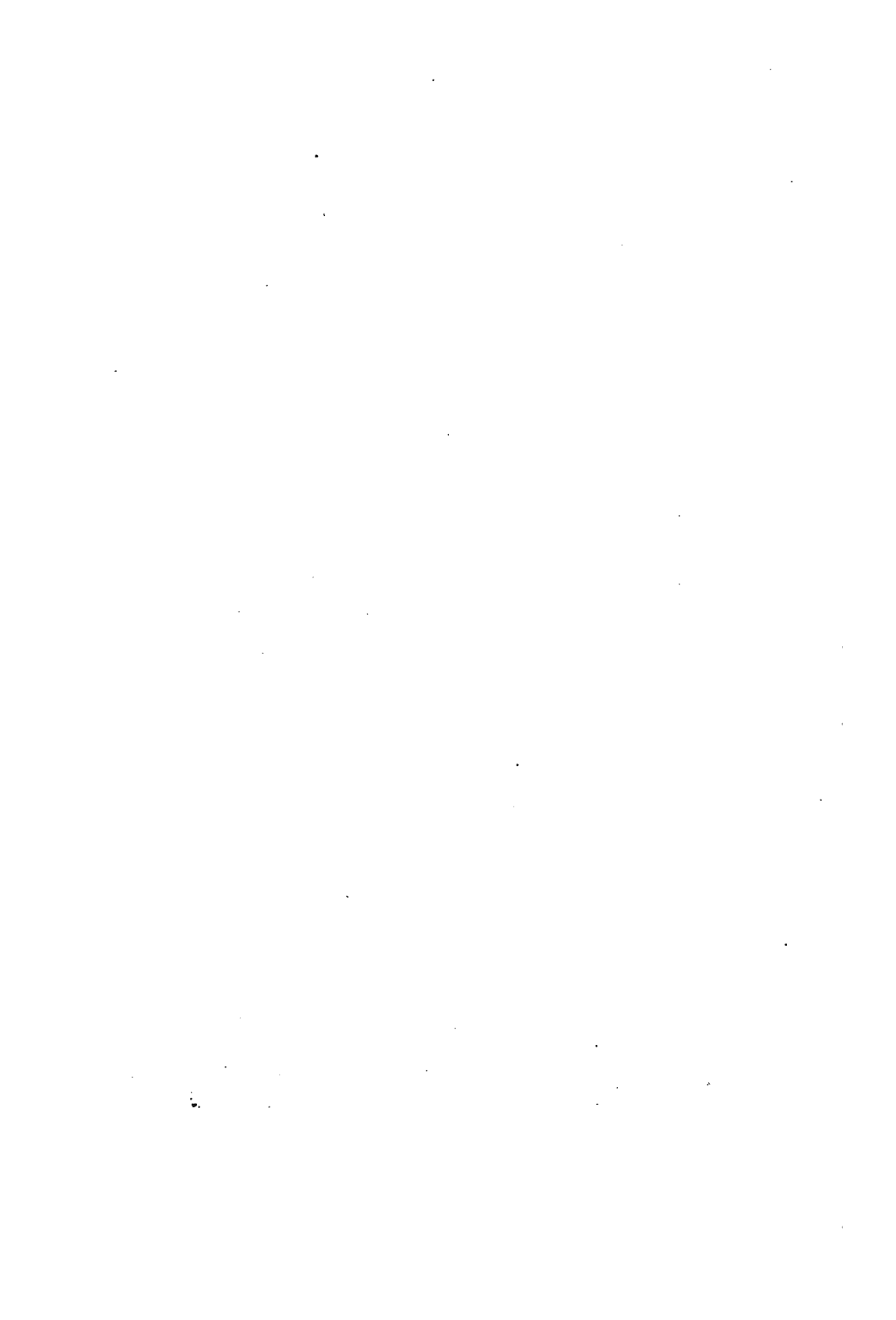
A few writers on recent improvements in Agriculture, are so bewildered, and on such good terms with themselves, that they fancy that Agriculture in all its ramifications has reached the highest degree of perfection, and is *un fait accompli*; if such advancements were acted upon, it would be very fatal—but no fear, Agriculture will, and must march forward, and if men be but grateful to the soil, the soil will be tenfold generous to them; as, with scientific aid, there is scarcely any limit to the productions of the soil.

In this age of enlightenment, Agriculture is not appreciated at its just value: and all who have

noticed of late years the comments of the Press, will have observed their efforts to persuade the public that the prosperity of this Empire is owing almost exclusively to manufacture and commercial industry. To impress such notions upon an ill-informed public is an easy task ; for every aggrandisement in the manufacturing industry is at once striking to the eye, while the most important and scientific improvements and progress in Agriculture, are comparatively invisible ; in a social and moral point of view the dignity unquestionably appertains to Agriculture ; and, although Civilization cannot exactly and exclusively be traced in Agricultural improvement, yet it is a fact, that wherever Agriculture is brought to great perfection, there also Civilization is not behind.

The Capital embarked in Agriculture, is more important (again in a moral and social point of view) than the most ingenious operation of the manufacturer, or the most successful commercial speculation ; as we must all admit, that all the immense machinery ever invented by the genius of man, cannot, by any possibility, add one Beet Root grain upon an acre of land.

I do not wish to extol the dignity of Agriculture to the prejudice of Manufacture, and it is of the utmost importance that both should march together in harmony, especially in this modern branch of industry—Beet Root Sugar.



CHAPTER I.

STATISTICS OF THE IMPORTS OF SUGAR IN THE UNITED KINGDOM, WITH REMARKS.

At the moment my Pamphlet was going to press, I received from the Board of Trade the Statistics of the importation of Sugar in the United Kingdom for 1869. Those Statements, although they have already been before the public through the usual official channels, the author cannot help reproducing in his front pages, in order that they may not escape the notice of those who are not cognizant of these important Statistics; by this account it will be seen at a glance the immense importance of the Beet Root Sugar question, and of the great necessity of Sugar as aliment for the human race.

Sugar ranks next to Bread and Meat, in fact as much money is spent in Sugar as in Bread, or nearly so. However, it must be stated, that in no other country is so much Sugar consumed as in the United Kingdom; but as our soil, by the co-operation of the agriculturist, must, and will, go on increasing its production of the raw material, "Beet Root," it follows, that its conversion into Sugar will also necessarily increase at the same rate, and it may be fully anticipated, that in a short period, Sugar from Beet Root will be sold in retail

at $4\frac{1}{2}d$.* per lb., which is now sold at $6d$. lb.; such a reduction in the price of Sugar will not deter the grower of Beet Root Sugar, nor deter the Sugar Manufacturer, as the emoluments of both are immense.

What a contrast in the price of Sugar to that of 1810, when in France it had risen to 9 francs the kilogramme, $3s\ 9d$ per lb., through the arbitrary measures of the great Egoist, Napoleon the first.

Since I have communicated to some friends my intention of writing a few pages on the Sugar question, I have been favoured with many Statistics, which in my concise little work I cannot produce. Moreover, they most all refer to the Manufactory Department.†

* This reduction in price can only be expected through a vast increase in the growth of Beet Root and its Manufacture into Sugar, because every nation, is every year consuming more Sugar, not only as a luxury, but as an indispensable aliment of daily food.

† As the Manufacture of Beet Root Sugar, is the most important part of the Beet Root Sugar question, I intend to publish a Pamphlet upon it.

The following Statistics, forwarded by the Board of Trade, were accompanied by a kind and obliging note from Mr. Fonblanque.

“BOARD OF TRADE.

“Mr. Fonblanque presents his compliments to Mr. De Man, and in accordance with the request contained in his letter of the 17th instant, begs to enclose an account of the quantity of Sugar imported into the United Kingdom, from various countries in the year 1869.

“STATISTICAL DEPARTMENT,

Board of Trade,

20th Oct. 1870.”

*An Account of the Imports of Sugar for the
Year 1869.*

COUNTRIES WHENCE IMPORTED.	QUANTITIES IMPORTED.
Sugar: Refined, as Sugar equal in quality thereto and Sugar Candy:	Cwts.
From Hamburg	30,003
" Holland	465,905
" Belgium	65,133
" France	488,304
" Egypt	5,078
" other Parts	14,517
Total	1,068,940
" Unrefined of all kinds:	Cwts.
From Hamburg	366,717
" Bremen	34,501
" Holland	128,580
" Belgium	74,477
" France	420,286
" Egypt	57,317
" Java	114,931
" Philippine Islands	759,018
" China	81,321
" Cuba	2,867,453
" Porto Rico	262,138
" Dutch Guiana	52,481
" United States: N. Atlantic parts	20,818
" " Parts on the Pacific	4
" Central America	36,488
" Peru	17,526
" Brazil	1,399,856
" British Possessions in S. Africa	46,851
" Mauritius	423,411
" British India: Bombay and Sinde	1,878
" " Madras	196,541
" " Bengal and Pegu	199,348
" Straits Settlements	93,387
" British West India Islands	2,671,332
" British Guiana	670,187
" British Honduras	13,202
" other Parts	23,604
Total	11,033,653

From the total imports of Sugar into the United Kingdom in 1869, namely, 12,120,593 cwt., only about 1,500,000 cwt. are the produce of Beet Root.

If all the European States were to consume Sugar at the rate of the United Kingdom, the quantity required to supply the demand would be 5,000,000 tons annually; this, at the approximate value of £30. per ton, shows a total of £150,000,000, which would be spent in Sugar by our European population.

One English acre of Beet Root, produces one ton of Sugar, or rather a little more, but in those large figures one cannot be particular to a fraction, especially, when the various Statistics supplied by the different States, vary somewhat more or less; let it therefore be considered to be near the mark, that in round numbers 5,000,000 acres of land will be required to produce 5,000,000 tons of Sugar.

The ground cultivated in 1868 all over Europe, was about 650,000 acres, consequently there is a *little room left*, to grow some more Beet Sugar, namely, 4,350,000 acres.

CHAPTER II.

THE DIFFERENT EFFECTS OF CANE SUGAR AND
BEET ROOT SUGAR UPON OUR ORGANS.

Opinions are divided on the subject of the action of sugar upon our organs. According to Dr. Rouilli l'ainé, *C'est le plus parfait des Aliments*: He reports examples of longevity attributed to the use of abundance of sugar. Other medical men have, on the contrary, attributed to immoderate use of Cane Sugar, that the mouth becomes sticky and gluish, causes thirst and stomach burnings.

Dr. Stark, who tried to feed himself for some time exclusively with bread, water, and sugared water, began with taking 125 grammes, then 250, then 500, and at last 612 grammes per day. He soon became (no wonder) nausea,* the interior of the mouth inflamed, the gums swollen, producing hemorrhage. However, those fatal effects, it will be easily conceived, must be attributed exclusively to

* These medical experiments were most likely made with Cane Sugar, had they been made with Beet Root Sugar they might have produced a different effect; but to use such a quantity of sugar without any other food, is simply an absurdity, especially for a medical man.

the unreasonable use of sugar. Sugar it is commonly said spoils the teeth, this is unquestionably an error, because the Negroes of the Cane Sugar plantations, whose food is principally sugar, have much whiter teeth than the generality of our European people.

The Beet Root Sugar, according to the highest medical authorities, is unquestionably far superior as an aliment, in wholesome and nutritious quantities, to Cane Sugar.

Sugar has come into the world through the patronage of doctors and chemists, consequently it had to play a grand rôle. Under an ægis so impenetrable the use of sugar has become daily more extensive, more general, and no alimentary substance has undergone more amalgamations and transformations.

We must admit that the instinctive predilection of men, and of many animals for all that is sweet, proves that the organism stands in need of it; and it has become the general conviction that sugar, used in moderation (but, let it be understood, sugar from the Beet Root) facilitates invariably digestion; every body, *tout le monde*, is aware by experience, that "the most beautiful white sugar, and the most delicious in taste," says Liebig, "is now manufactured from the Beet Root."

It is asserted by reliable authority, as I have already stated, that at the present day as much money is spent in sugar as in bread; and my own

consumption of sugar strengthens these assertions. I spend a shilling per week for sugar, and only ninepence for bread.* It is considered that the higher class spend four times as much money in sugar as in bread, as it is used by them in a hundred varieties of food, especially in luxurious dishes.

The middle class spend quite as much money in sugar as in bread. The lower class, of course, spend more money for their bread than for their sugar; but take the average of the consumption of sugar by the different classes of society, it is an unquestionable fact that as much money is spent in sugar as in bread all over Europe.

In some of the northern countries of Europe, for instance, in Russia, Sweden, and Denmark, sugars are used in salads, in certain soups, and in a variety of other culinary preparations; many of those dishes I am quite satisfied do not suit our taste.

While I am slightly touching on the use of sugar, I cannot help giving a few passages on the subject from a celebrated French physiologist, *du Gout*. He says :—

“ Le sucre est entré dans le monde par l'officine des apothicaires. Il devait y jouer un grand rôle, car pour désigner quelqu'un à qui il aurait manqué quelque chose essentielle,

* It may appear a little ridiculous to give an account of a portion of my own diet, but I only want to prove that I have been fond of sugar from my youth, and now that I am getting old I am as fond of it as ever.

on disait : c'est comme un apothicaire sans sucre. Il suffisait qu'il vint de là pour qu'on le reçût avec défaveur ; les uns disaient qu'il était échauffant, d'autres qu'il attaquait la poitrine, quelques-uns qu'il disposait à apoplexie ; mais la calomnie fut obligée de s'enfuir devant la vérité, et il y a plus de quatre-vingts ans que fut proféré ce mémorable apophthegme : *le sucre ne fait mal qu'à la bourse.*

"Souise une égide aussi impénétrable, l'usage du sucre est devenu chaque jour plus fréquent, plus général, et il n'est pas de substance alimentaire qui ait subi plus d'amalgames et de transformations.

"Bien des personnes aiment à manger le sucre pur, et, dans quelques cas, la plupart désespérés, la Faculté l'ordonne sous cette forme, comme un remède qui ne peut nuire et qui n'a du moins rien de repoussant.

"Mêlé à l'eau, il donne l'eau sucrée, boisson rafraîchissante, saine, agréable, et quelquefois salutaire comme remède. Mêlé à l'eau en plus forte dose, et concentré par le feu, il donne les sirops, qui se chargent de tous les parfums, et présentent à toute heure un rafraîchissement qui plait à tout le monde par sa variété.

"Mêlé à l'eau, dont l'art vient ensuite soustraire le calorique, il donne les glaces, qui sont d'origine italienne, et dont l'importation paraît due à Catherine de Médicis.

"Mêlé au vin, il donne un cordial, un restaurant tellement reconnu que dans quelques pays, on en mouille des rôties qu'on porte aux mariés la première nuit de leurs noces, de la même manière qu'en Perse des pieds de mouton au vinaigre.

"Mêlé à la farine et aux œufs, il donne les biscuits, les macarons, les croquignoles, les babas, et cette multitude de pâtisseries légères qui constitue l'art assez récent du pâtissier petit-fournier.

"Mêlé avec le lait, il donne les crèmes, les blancs-mangers et autres préparations d'office qui terminent si agréablement un second service, en substituant au goût substantiel des viandes un parfum plus fin et plus éthéré.

“ Mêlé au café, il en fait ressortir l'arôme.

“ Mêlé au café et au lait, il donne un aliment léger, agréable, facile à se procurer, et qui convient parfaitement à ceux pour qui le travail de cabinet suit immédiatement le déjeuner. Le café au lait plaît aussi souverainement aux dames ; mais l'œil clairvoyant de la science a découvert que, un usage trop fréquent pouvait leur nuire dans ce qu'elles ont de plus cher.

“ Mêlé aux fruits et aux fleurs, il donne les confitures, les marmelades, les conserves, les pâtes et les candis ; méthode de conservation qui nous fait jouir du parfum de ces fruit et de ces fleurs longtemps après l'époque que la nature avait fixée pour leur durée.

“ Peut-être, envisagé sous ce dernier rapport, le sucre pourrait-il être employé avec avantage, dans l'art de l'embaumement, encore peu avancé parmi nous.

“ Enfin le sucre, mêlé à l'alcool, donne des liqueurs spiritueuses, inventées, comme on sait, pour réchauffer la veillesse de Louis XIV., et qui, saisissant le palais par leur énergie, et l'odorat par les gaz parfumés qui y sont joints, forment en ce moment le *ne plus ultra* des jouissances du goût.

“ L'usage du sucre ne se borne pas là. On peut dire qu'il est le condiment universel, et qu'il ne gâte rien. Quelques personnes en usent avec les viandes, quelquefois avec les légumes et souvent avec les fruits à la main. Il est de rigueur dans les boissons composées le plus à la mode, telles que le punch, le negus, le sillabab, et autres d'origine exotique, et ses applications varient à l'infini, parce qu'elles se modifient au gré des peuples et des individus.

“ Telle est cette substance que les Français du temps de Louis XIII. connaissaient à peine de nom, et qui, pour ceux du XIX^e siècle, est devenue une denrée de première nécessité ; car il n'est pas de femme, surtout dans l'aisance, qui ne dépense plus d'argent pour son sucre que pour son pain. M. Delacroix, littérateur aussi aimable que profond, se plaignait à

Versailles du prix du sucre, qui, à cette époque, dépassait cinq francs : Ah ! disait-il, d'une voix douce et tendre, si jamais le sucre venait à trente sous, je ne boirais jamais d'eau qu'elle ne soit sucrée. Ses vœux ont été exaucés ; il vit encore et j'espère qu'il se sera tenu parole."

The extract just given I have produced in its original, as I fancy it will read more gracefully, especially for the fair sex.

An almost endless account can be given of the use of sugar in a thousand varieties of food, but to enter further upon this topic I have neither space nor inclination.

CHAPTER III.

CONTROVERSIAL ARGUMENTS AND REALISED
FACTS IN FAVOUR OF BEET ROOT SUGAR.

It appears from public and private information that the majority of English agriculturists and landed proprietors are still averse to the introduction of this modern branch of agriculture and manufacture into the United Kingdom—on what grounds these assertions are based, I am at a loss to understand.

The men who have recently come forward to impress upon agriculturists and landed proprietors the interest they have of grasping at this prolific source of national wealth, are men of genius, "*Hommes de Genie*,"* who have perhaps not the slightest direct interest in this Beet Root Sugar question, but who are purely and simply guided by their convictions, that to neglect such an opportunity of bestowing a boon of an inestimable importance upon society at large, may be justly called a national calamity, inasmuch as it is a question of producing from our own soil an aliment, not only as an article of luxury, but of general necessity.

* Let it, pray, be understood, that I would rather not rank myself under this category.

The Beet Root plant is with propriety called an industrial and commercial plant, "*Plante industrielle et commerciale*;" no other root plant can come up to the beet root sugar plant, to play that great rôle which she is destined to play, in her industrial and commercial capacity. At the present time, sugar is amongst the most valuable products known to man, and in commercial importance it is surpassed by very few commodities.

The advocates of the Beet Root Sugar question, are under the impression that the culture of the beetroot in the United Kingdom is checked through the notion that it is an exhaustive crop. This is an error, nay, it is a fallacy; a fact, however, which is now pretty well settled and understood by many of the leading scientific agriculturists.

To quote the words of the celebrated Einhoff, after he had compared the Swedish turnip, the potato, the meadow hay, carrots, and the beet, he says: "Of all these root plants, the least exhaustive for the land is the beet root." In fact, in many instances in Belgium, where in some fields of late a large quantity of extra manure has been applied to force an extra large heavy crop of beet root, exclusively for cattle food, it has been found that the land remains so exceedingly rich that they are at a loss to know what to grow after beet root. Wheat crops have been tried with fatal results; the straw has in every instance grown up so luxuriantly, that at the first heavy shower of rain the wheat

•

was dashed to the ground, and became a heap of rotten straw, without producing any corn.

Such facts, on which reliance can be placed, do not look as if the soil had been exhausted by the beet root plant. But independent of the beet root crop fertilizing and enriching the soil, one acre of beet root brings back to the soil in the form of pulp, the refuse of beet root, as food for cattle, or as direct manure to the land, the value of £3. per acre, for which, at this price, there is a market without limit. For the last two years the demand for this pulp has been immensely increased; since it has been proved that these pulps are of greater value than £3. per acre, in using them as manure for the land.*

Let me ask, is there any other crop, either cereal or root crop, which returns to the soil the value of £3. per acre in the form of manures; it must be understood that if these pulps are used for cattle food, the value is equally returned to the soil, but indirectly.

The word exhaustion, for several years past, seems to have caused a sort of panic among several extensive landed proprietors.

When, years ago, I had written a work, "The Flax Industry," (Ridgway, Piccadilly), I then very often had conversations with extensive landed proprietors on the topic of flax. Many objected to intro-

* These pulps should be spread equally over the land, and ploughed in three inches deep in autumn.

duce it on their estates on the ground that it was an exhaustive crop. I almost invariably referred those gentlemen to what I had said in page 129, "Flax Industry," (Ridgway, Piccadilly,) which is as follows:—"Since flax, to secure a fine silky fibre, should be pulled in a very green state, it follows that flax can only be considered as a green crop ; and as the preparation of land for flax requires more ploughing, subsoiling, and cleansing than for any other crop, it consequently follows that the flax culture instead of exhausting the land, cleanses and fertilises the soil."

Another argument with which I had to convince those gentlemen with whom I was brought into contact, on the exhaustion of the flax crop, was that (besides the production of its valuable fibre) the flax crop produced seed to the value of £2. 15s per acre,* which of necessity was returned indirectly to the soil in manure, after having served as cattle food.

I am deviating from my subject in alluding to

* In stating that flax seed is worth £2. 15s per acre, I cannot help mentioning that when in 1841 I went to Ireland, by the invitation of the Royal Flax Improvement Society, I found among the many defects in the Irish Flax industry, the most distressing was, that the Irish flax growers for two hundred years past had never saved one grain of their flax seed, and yet during that long period flax had been grown at the rate of 50,000 acres yearly, and was now grown from 100,000 to 150,000 per annum, of which the seed is now saved, through the exertions of the Royal Improvement Flax Society.

the flax industry, but I do so to prove that the impression entertained some years ago of the flax crop being exhaustive to the soil, has been refuted and set at rest, and that the same argument stands good for the refutation of the presumed exhaustion with reference to the beet root sugar crop.

English agriculturists may also object to the introduction of this modern branch of industry, on the ground that they are almost entirely strangers to the various modes of growing the beet root sugar. Others may object on the ground of being unacquainted with the various processes of its manufacture into sugar. But let me ask, is there any secrecy in these processes? None whatever. The difficulties with which the continental people had to contend with for many years past, and which were not of a trifling nature, those difficulties are overcome at the present day; and now the way is traced out to the people of the United Kingdom.*

To begin for instance to grow 25 acres of beet root by a farmer of 300 acres, can he run any risk? Supposing he cannot dispose of his crop to a manufacturer, has he not the use of it for his cattle?

In Belgium the beet root is now the substitute for mangel-wurzel, the beet root producing sweeter milk and more delicious butter—and has also more fattening qualities. Mangel has therefore seen his

* German skilled labourers, who are acquainted with everything connected with this modern branch of industry would be easily obtained.

day. Continental people are quite surprised to find the British with all their conspicuous known pluck, so backward in introducing a modern branch of agriculture and manufacture; of course foreigners are but too glad to have the field all to themselves; at the same time we must confess that British indifference in this most important question, does not harmonize with their world-wide renown, of skill, excellence, and enterprise.

CHAPTER IV.

TO CULTIVATE AND MANUFACTURE BEET ROOT SUGAR WITH GREAT ADVANTAGE, IT SHOULD BE CONDUCTED ON A LARGE SCALE.

To cultivate Beet Root for the manufacture of sugar, and to manufacture Beet Root Sugar profitably, both must be conducted on a large scale. Numbers, energy, association, and capital are required—a resolution of many people to succeed, and a concentration of many powers that they may accomplish success. Individual enterprise cannot be relied on, to introduce a branch of industry which in its various ramifications are somewhat complicated; this simply proves that there is immense importance involved in this “Beet Root question.” It would be against the order of things

if after scientific researches and labours there should be no reward for enterprise.

Many of the farmers of this United Kingdom, as I have already said, are too independent to trouble themselves much about introducing new (or what they may call perhaps foreign) crops. The fairest mercantile speculations have to contend at the outset with the strangest apathy, and even where the surest road to success lies open to energetic efforts there are those who, from want of means or want of spirit, cannot or will not co-operate in the undertaking.

Improvements in the cultivation of Beet Root, which must tend to its more abundant or cheaper production, can be more rapidly and economically applied under an extended system of farming.

It is quite unnecessary for me to dwell here upon the great economy of carrying on manufacture of any kind on a large scale, the advantages of which are known to everybody. But I may observe, that there are none which present a better example than that of Beet Root Sugar.

When at the commencement of this century this branch of industry started on the Continent, it was carried on only on a small scale; this, however, did not cause any failures, but it was not for a series of years a lucrative business; besides, being but small concerns, they had to learn the various processes of manufacturing the Beet Root Sugar, and also its proper culture, in which they were also very ignorant.

This difficulty overcome, and having formed themselves into extensive firms, it soon became the most flourishing branch of agriculture, manufacture, and commerce on the Continent, in which Germany is now taking the lead. There are now at the present moment 843 manufactories at work in Germany, France, and Belgium, most of them being on gigantic scales,* consuming from 20,000 to 60,000 tons of Beet Root annually.

A company or an extensive firm growing Beet for the supply of its own factories, can make a better selection of the roots from which the sugar is to be extracted. But what becomes of the refuse? this, of course, is already pretty well understood, namely, that some portion is excellent food for cattle; another portion (the leaves,†) good manure for the soil, and another portion from which an excellent spirit is produced.

Why should not a company, or large firm, have their own cattle to consume the waste or rejected Beet, fatten on the expressed residue of the roots, and supply abundance of valuable manure; such a plan would unquestionably increase the security

* The sugar produced by these manufacturers is only, as already stated, about the tenth part of the sugar that is requisite for the consumption of the population of Europe, so that there is room for more sugar establishments.

† The leaves of the Beet should not be given as food to the cattle, but be strewn over the land, which is an excellent manure, especially when covered in by a ploughing three or four inches deep.

for capital, and considerably enhance the profits of the shareholders.

The necessity for capital for associated energy, for extended management, for trained labour, for the application of the newest improvements, on the farm or in the factory, the importance of ensuring a steady supply of the raw material, the self-evident conclusion that Beet Root can be grown by the manufacturer for his own use, on his own lands, cheaper and better than he can buy it—prove, I think, beyond all controversy, that the cultivation of Beet Root and the manufacture of Beet Root Sugar, should form one and the same enterprise, and be undertaken together. The United Kingdom is *par excellence*, the country to embark in this modern branch of industry on a large scale. Belgium, on the contrary, is better suited for a medium scale, as will be seen in the following pages.

CHAPTER V.

THE MODES IN WHICH BEET ROOT SUGAR IS
SOLD IN BELGIUM TO THE MANUFACTURERS.

Although I am an advocate of seeing this branch of agriculture, manufacture, and commerce, carried on on a large scale, I must confess that in Belgium it is only yet carried on on a medium scale, which for Belgium answers exceedingly well, and has unquestionably become the most lucrative and the most pleasant branch of agriculture. I mention pleasant, because the crop is one of exceedingly little trouble. The farmer sows his seed from the 1st to the 15th of April, according to the weather and nature of the land. This done, the farmer has nothing more to do with the crop except to keep it free from weeds. A fortnight before the crop comes to maturity, the factors of the numerous sugar factories, overrun the country to purchase the Beet Root crop from the farmers as it stands *on foot*, giving so much an acre; this year they have given from £21. to £24. per acre, the crop being heavy. Let it be understood that this crop is sold to the Beet Root manufacturer generally at the end of September. The very day that the

crop is sold, the farmer receives cash for it, and has nothing more to do with the crop. Is this Beet Root crop not therefore justly called a pleasant crop, besides a very remunerative crop? The seed is given to the soil in April, and the cash is given to the grower in September, for his production. Who will tell me that the soil produces another crop to equal Beet Root Sugar?

There is another mode of disposing of the Beet Root in Belgium, the same as is practised in Germany and France, namely, to sell by weight, at so much per ton, this year from 22*s* to 24*s* per ton has been paid in Belgium,* of course it is understood that in selling by the ton the farmer has more trouble and responsibility with the crop, than in selling straight out and done with it; in fact, this latter mode of disposing of the crop is the great *recherché* of the Belgian small farmer.

The nearer the time approaches of the crop coming to its maturity, the more is the country overrun by the buyers of the great number of sugar manufacturers. A farmer will very often be called upon by four or five buyers in a day, outbidding each other as *par enchantement*. In giving this account, I must confess I cannot help smiling, as I fancy I see those men (the factors) gesticulate in walking with the farmers round their fields of

* The French and German sugar manufacturers do not pay so much.

Beet Root, telling them that no other buyer will give so good a price for their Beet Root.* This kind of conversation, or shall I say chat, very often makes an impression upon the small farmers, as though sharp in their ways, they are mostly great simpletons, but of good nature. The factors or buyers on the other hand are generally of a very different caste.

The sugar manufacturers in Belgium are most all landed proprietors of perhaps 1000 or 2000 acres, from which they farm themselves often from 200 to 400 acres. They sow one-fourth of their farm yearly with Beet Root. Their tenants are compelled to do the same by lease agreement, of course the tenants want nothing better, and they would be glad to sow half of their farms yearly with Beet Root, but to this the proprietor manufacturer objects on the ground that the Beet degenerates in sugar qualities when grown oftener than in a four years' rotation. The proprietor does not for a moment think that the growth of Beet Root by a four years' rotation is exhaustive to the soil, still he makes it a point to raise his rents to all his tenants who grow Beet Root, and why? Simply because he knows that his tenant can afford to pay

* A naturalised British subject, but yet a native of Belgium, I know in what comical way such transactions are settled.

a better rent from the great profits derived from the growth of Beet Root. Such behaviour on the part of the proprietor is, I need not say, very generous, but being but small landed proprietors they are almost invariably cunning; but to modify somewhat the meaning of the word cunning, I will at least say that they are not generous nor kind to their tenants as in England. That the sugar manufacturers are particularly successful in their sugar manufactories, is owing partly to the vigilance and economy with which those establishments are conducted. The partners are generally all active men, superintending personally every process and operation. Most of the Belgian factories convert every season from 6000 to 7000 tons of Beet Root into sugar. That the sugar manufacturers are very numerous in Belgium, is all in favour of the small farmers, as they need not be under any apprehension of not finding a good market for their crops.

This modern branch of industry is a combination of agriculture and manufacture so closely connected and linked together, and so evidently remunerative, that it must necessarily attract public attention.

The following is a statement of the value of an acre of Beet Root, and the expenses of growing an acre of Beet Root in West Flanders.

Net value of an acre sold <i>on foot</i>	£20	0	0
Rent and taxes	£2	10	0
Ploughing, harrowing, &c. .	1	5	0
*Manure	2	5	0
Seed and sowing	0	10	0
Weeding, &c. &c. . . .	1	10	0
		8	0 0

Leaving net profit to the grower £12 0 0

I do not hesitate in stating that an acre of Beet Root Sugar can be grown in England at the same cost as in Belgium, rents are higher in Belgium where Beet Root is grown, but labour is cheaper.

* This is about an average value of manure to the acre for Beet grown for the sugar factories. To apply more or less depends upon the degree of richness of the land.

CHAPTER VI.

EXPERIMENTS WITH THE BEET ROOT AND
OTHER VEGETABLE PLANTS.LINSEED OIL, AND OTHER LIQUIDS, POWERFUL
STIMULANTS TO GROW THE BEET ROOT PLANT
TO AN EXTRAORDINARY SIZE.

A relative of the author, an amateur scientific agriculturist, has of late years tried experiments in his garden ground, by manuring some vegetables. Such as sperre-grass, salads, spinage, and other vegetables, with linseed oil as manure (or what we call flaxseed oil). A certain quantity of oil is spread over the soil about two months previous to sowing the seeds. Salads, and spinages, so manured, have sprung up in four weeks to a size large enough for general use, the same species requiring nine weeks to grow to the same sizes, with ordinary manure. The vegetables produced by these powerful stimulants, are much more tender, and of a more delicious taste, than those grown in the usual way.

The party to whom I am alluding, farms 120 acres out of a portion of his property near Avelghim, West Flanders. He grows yearly thirty acres of Beet Root for a sugar factory in which he is a partner. Several Belgian agriculturists, as well

as himself, have of late years made so many experiments with the Beet Root Plant, that they can now, by proportioning a given quantity of manure to the acre, calculate upon a certain produce of tons per acre; this question has been studied with great attention, and earnestness, especially by parties who are interested in Sugar Factories, because they do not want more than twenty to twenty-two tons per acres. My relative had flattered himself, that this season, if the season was favourable, he would grow exactly twenty-two tons of Beet Root Sugar per acre, for the Sugar factory, and so near has his calculation been verified, that the result has been twenty-two tons six cwt. per acre. He had also flattered himself to his neighbours, that he could grow seventy tons of Beet Root for cattle food to the acre, in this experiment he has somewhat failed in his calculation. Since the production upon an *eighth* part of an acre, has been ten tons five cwt. which is at the rate of eighty-two tons per acre. How was this extraordinary produce obtained? Simply, by the spreading of 50s of linseed oil, over the eighth part of an acre, being at the rate of £20. per acre.*

* These Beet Roots, weigh from 20 to 40 lbs. The largest will be sent to various exhibitions. Such experiments are worthy to be tried by British agriculturists, and I think that this artificial manure will in future be used on a large scale for green crops only. The oil is spread over the land, if possible on a rainy day, if not on a rainy day, water must be spread im-

But now let us see the importance and value of this experiment; this small portion of an acre, was grown upon the same field as the thirty acres to which I have alluded, and which were grown for the Sugar Factory; and the soil had not been prepared in any particular way for this experiment. Therefore the expenses for rent, labour, seed, &c. could be at the utmost £10. per acre, added to this, the £20. for linseed oil, manure; brings the total expenses to £30. per acre. This mode of growing the Beet Root would not answer for the Sugar manufacturer, as it only contained $1\frac{1}{4}$ per cent. of sugar; but what value does it assume as cattle food?

This is the important question.

These Beet Root plants in their integrity are of greater value than the refuse of the plants, called pulp.

This refuse, the pulp, for which there is an unlimited market, is now sold from 12s to 13s per ton, and surely, the Beet Root in its integrity must be worth more than the refuse of the plant, but preferring to be under the mark than above it, let the 82 tons of beet root be valued at 12s per ton, its total will be £49. 4s. Deducting the ex-

mediately over the oil with a watering cart; or otherwise the oil should not be exposed to the sun. Colza oil has also been tried for garden vegetables, but Colza oil does not possess such stimulant power as linseed oil, yet it is also a wonderful stimulant for green plants.

penses, £30. will leave a net profit of £19. 4s per acre.

An experiment has been made in France with another kind of liquid manure, the result of which is still more extraordinary. It is on the authority of M. Villeroy, a gentleman extensively engaged in this modern branch of industry, that I produce the following account :—

“M. Villeroy rapporte qu’un chaudronnier de Deux-Ponts est parvenu à obtenir jusqu’à 250,000 kilogrammes de betteraves rouges longues, et pesant de 8 à 9 kilogr. en répandant sur ses terres les urines des étables voisines. En Belgique, on a employé le même moyen pour obtenir des betteraves pesant jusqu’à 20 kilogrammes destinées à figurer dans les expositions.”*

When these extraordinary accounts of such experiments reach me, I ask myself what shall we hear next of this *Plante Prodigeuse*—and on this occasion I am entitled, I think, to repeat my motto: “That the Beet Root plant is destined to play a great role in the industrial and commercial world,” for really such capabilities of extraordinary production are unique to the Beet Root plant.

If experiments were tried to any cereal or flax crops, to obtain a double or triple produce above the ordinary one, by forcing the growth of such

* This sort of Beet Root plant is of a brown-reddish colour. It is called by some French people *La Bête Rouge*; it grows partly out of the soil. By some it is called *La Vigoureuse*.

crops through the medium of abundant artificial manure, those crops would undoubtedly perform their mission in growing up in luxury; but having grown up supple and fragile to a great height, what would be the consequence? Why, the first heavy shower of rain would crush the crop down, never to rise again, and to rot on the soil instead of giving a double or triple production. All who have observed the course of the growth of crops will admit the reality of these assertions.

This Beet Root plant, with all its industrial and commercial advantages, seems to possess at the same time the advantage of being sheltered from the disasters of the elements, to which many other plants are exposed.

CHAPTER VII.

SOIL AND CLIMATE OF THE FLANDERS,
WITH REFERENCE TO THE CULTURE OF BEET-ROOT
SUGAR IN THE UNITED KINGDOM; ALSO A WORD
ON CANE SUGAR.

Two gentlemen of the Royal Agricultural Society of England, of the highest authority, Mr. H. M. Jenkins and Dr. Voelcker, went last year in deputation to Belgium, to report upon Belgian agriculture. A passage of the Report on the Soil and Climate of West Flanders runs as follows:—

“Its soil is naturally the almost pure blowing sand which forms the subsoil, and which is known to geologists as the campine sands.

“With sandy soil, an abundance of moisture, a sheltered position, and a coast line washed by a sea warmed by the Gulf stream, the climate of Northern Belgium is naturally favourable for the practice most characteristic of its agriculture, namely, the growth of two crops in one year. Like the greater portion of England, the kingdom of Belgium lies within the zone of 50° Fahr. mean annual temperature; but neither this nor the mean annual rainfall have much bearing on the agriculture of the countries, for it is the distribution of the moisture and the temperature which really influences differences in agricultural practice. The mean summer temperature and summer rainfall affect the farming to a considerable extent, and the mean winter temperature and winter rainfall have a comparatively slight influence.

“The mean summer temperature of England is about 61°

Fahr., that of Flanders is about 63° Fahr. ; in winter these relations are reversed, being 39° in England, and 37° in Flanders. The rainfall of Flanders is greater than that of England, being about 30 inches per annum, one-fifth of which is summer rain ; but in a great portion of England, the quantity of summer rain is larger. The average number of rainy days in England is between 150 and 160 per annum ; in Flanders, according to Mr. Houzeau, it rains on the average 190 days in every year.* One other fact in the climatology of Flanders is also favourable to the catch-crop system, viz. the greater amount of summer heat than we obtain in England. This condition, and the length of the solar day, combine to advance the ripening of the corn crops."

This extract from the Report of the Royal Agricultural Society of England, simply proves that the geographical position and climate of Belgium possesses some advantages over England in the growth of seed and green crops. On the other hand, it proves distinctly that the soil and climate of this United Kingdom is exquisitely better adapted than the soil and climate of Belgium for the cultivation of Beet Root Sugar ; and yet it is upon those poor sandy soils that Beet Root Sugar is now actually grown, which offers the grower a net profit of £12. per acre.

Looking at this branch of modern industry in its true light, must we not all admit that this Beet Root question is destined to play a great role, not only in its agricultural form, but also in manufacture and commerce ; since it is a question of producing

* Belgium has not 190 rainy days every year, it should be 180 days.

from our own soil an aliment for the consumption of 250 millions of people.* In fact, I am at a loss for expression to point out how strenuously the efforts of the most zealous and scientific agriculturist should be directed to the introduction and extension of the Beet Root Sugar culture.

That there is an unlimited market for Sugar manufactured from Beet Root, I have already attempted to show in previous pages, where I have stated that the whole amount of sugar produced in Europe up to the present day from Beet Root, does not amount to the tenth part of what we require for our European consumption. Another important fact which deserves and claims our earnest consideration is, that our efforts should be directed towards avoiding the use of the Cane Sugar, which, according to many medical authorities, is immensely inferior to the Beet Root Sugar in nutritious and wholesome qualities. It is to be hoped that the trade may be able to give the different sugars their true denomination, in order that Cane Sugar may be avoided and Beet Root Sugar preferred. The Cane Sugar is the production of either America, Africa, or Asia. The mode in which those sugars are manufactured by the black men does not command great attraction for its use. In the preparation of every article of food one looks for minute cleanliness and delicacy in its confection

* I am alluding to the population of Europe.

and preparation, but these black people by whom the Cane Sugar is manufactured, do not unfortunately consult our taste. However, several large English and French firms have lately supplied improved apparatuses to those foreign nations to extract the juice from the cane plants with more decency. Messrs. Pontifex and Co., of London, have been occupied in setting up improved machinery in the British colonies. Messrs. De Rosne and Co., of Paris, have done the same in Bourbon, Martinique, Cuba, and Java.

CHAPTER VIII.

THE BEST SOIL TO GROW BEET ROOT SUGAR.

The Beet Root plant can be cultivated upon a variety of land, but the plant is far from thriving equally upon all kinds of soil, and to obtain from all the same quantity of sugar.

The soils the most favourable for the Sugar Beet Root, are the soils *silico argileuse*, clay, loam and limy, or slightly damp in summer. Upon poor light sandy soils Beet Roots always remain small, yet of superior quality; on the other hand, upon very wet land, the plant will grow large, and will contain but little sugar and much water.

The experiments and analyses which have been made with the Beet Root plant from various soils

by German and French scientific men, are so numerous, that it would require large volumes to give even a concise extract of the results of their various experiments, and they are so exceedingly contradictory in their final results, that they would puzzle the generality of Beet growers, and do perhaps more harm than good. Such results must of necessity be expected at the outset, and it only proves that an intense interest has already been taken in this modern branch of agriculture, manufacture, and commerce, which I proclaim without hesitation to be only in its infancy, and from having given birth to numerous scientific researches, only shows the great importance of the question.

Another extract from the last Report of the Royal Agricultural Society of England, respecting the soil for Beet Root, will interest the British Beet grower perhaps more than that of any other authority, it says:—

“Like other green crops the Sugar Beet, though not equally well adapted for every kind of soil, is nevertheless grown on land varying greatly as regards depth, texture, and general physical and chemical properties. It may however be observed at once, that all soils incapable of being cultivated to a depth of at least 16 inches, are unsuited for the growth of Beet Sugar, because the plant grows almost entirely under ground, and therefore cannot be cultivated with advantage on very shallow soils. Peaty soils are not suitable for Beets, nor stiff clay soils, and, more or less, all soils in a bad state of cultivation are unsuitable for its cultivation.

"The chief requisites in soil upon which this crop is intended to be raised, are a sufficient depth and ready penetrability by the plant. A good friable deep turnip loam, and all soils on which potatoes grow to perfection, are perhaps the most eligible of all for the growth of Beet Roots. A moderate or even large amount of clay, far from being an undesirable element, is very useful for this crop, provided the land is well worked, and the clay has become friable by exposure to the air, and by general good management.

"It is sometimes stated that Beet Root can only be grown to perfection on light very porous, and naturally very poor soils; but this is a great mistake, for on naturally poor sandy land Sugar Beet cannot be grown economically. Such land requires to be previously well dunged in the autumn, and to be liberally treated with superphosphate at the time of sowing, before it will yield a paying crop of Beets; on the other hand, there is no soil so well suited for Beet as a good well worked deeply cultivated and thoroughly drained clay loam."

I cordially agree in many points with the Report just alluded to, indeed. The soil of the northern departments of France, is almost exclusively composed of clay-loams; and it is in the northern departments that Beet Root is most extensively grown, and where the sugar manufactories are very extensive and numerous. Some have now been at work for the last forty years. Many gentlemen, connected with several of these sugar manufactories, I have known personally for thirty years, amongst others Messrs. Paul Hamoir & Co. of Valenciennes.

The Beet Root crops in the northern departments of France are generally very heavy, and the produce is from twenty-three to twenty-six tons

per acre.* Strange to say the Belgian soil, where Beet Root is grown, is as different as day and night from the soil of the north of France; the Belgian soil, being a poor light sandy soil, especially the West Flanders, where, notwithstanding, good Beet Root is grown.

It may not be out of place here to mention that in the north of France recently, some small portion of Beet Root has been transplanted, and in some instances the fabulous produce of 85 tons per acre has been obtained.

Under the heading of "Transplantation of the Beet Root," a full account will be given of this extra process.

* The French manufacturers seldom pay more than 16s per ton for Sugar Beet.

CHAPTER IX.

GREAT BRITAIN AND IRELAND WELL SUITED
FOR THE CULTURE OF BEET ROOT SUGAR;
ALSO A WORD ON COUNTRY LIFE.

Mr. James Howard, M.P., who last year made a continental tour, reports very favourably on the great success of the Beet Root Sugar growers and manufacturers on the continent. His opinion is, that this plant can be grown in the United Kingdom with equal advantages, and I feel happy in supporting Mr. Howard's opinion.

In his work, "Continental Farming," he writes as follows:—

"The growth of Beet for the manufacture of sugar and spirits, forms the most important branch of farming in France, Belgium, and Germany. It has proved such a source of national wealth to these countries, that it naturally takes precedence of all other agricultural topics. For the past ten years the growers and manufacturers have supported a newspaper, *Journal des Fabricants de Sucre*, devoted to Beet Root culture and Sugar-making; that sugar could be extracted from Beet Root was known as early as 1747. The discovery was made by Margraf, a chemist of Berlin; but it excited little attention. About the close of the last century, another Berlin chemist, Achard, gave to the world an account of the process carried on at his Beet Root Sugar factory, in Silesia,

by which he extracted some four per cent of sugar. From that time the scientific men of the Continent were aroused to the importance of the subject. The attention of Napoleon having been directed to it, he determined upon introducing the manufacture on a large scale ; his view being the breaking up of the colonial prosperity of Great Britain, by excluding from France and the Continent the important colonial produce of sugar."

The question is not now to lay claims upon British interest, as Napoleon did, by attempting to prevent the British colonies from sending their sugar productions of the cane plant into Europe ; but it is now a question of promoting the mutual and international interest of European nations, to produce from their own soil, an article of luxurious food, for the consumption of which there is scarcely any limit.

"The first factory," says Mr. Howard further, "was established in France in 1809 ; since which time it has made steady, and, considering the difficulties, fiscal and otherwise, rapid progress. In less than 30 years from its introduction, no less than 50,000 tons of sugar were made from Beet ; and according to the last return there are now in France 470 sugar factories ; in Belgium, 116 ; and in Prussia, 255. In the Zollverein, 2,500,000 tons of Beet are annually converted into sugar. In Austria, Hungary, Russia, and other parts of Europe, the process is also successfully carried on. In France, that which was commenced as a military expedient, has proved to be not only an important department of national industry, but the most powerful stimulant to French agriculture."

The statements of Mr. Howard are not exaggerated in some respects ; on the contrary, I am

in possession of the correspondence of Belgian and French Beet Root sugar growers and sugar manufacturers, and their accounts all agree, that the introduction of Beet Root Sugar into France and Belgium as an industrial crop, is the greatest regeneration which can be bestowed upon nations through the agency of the soil.

Mr. Howard wishes to prove, and with great propriety he can do so, that the soil and climate of a great portion of England* are quite as suitable as France, Belgium, and Germany, to grow the Beet Root.

Mr. Howard says:—

“ That the soil and climate of the drier parts of England are well suited to the growth of the root is clearly set at rest, not only by the analytical test made by Professor Voelcker upon roots grown in England, in Belgium, and in France, but by practical results obtained by Mr. Duncan, at his newly established sugar factory in Suffolk. The per centage of sugar in Beet is, upon an average, estimated on the Continent at about eleven per cent, whilst the roots analysed by Professor Voelcker, grown at Barking, with London sewage only as manure, contained thirteen per cent of sugar, equal to the very best Silesian. That the Sugar Beet requires for its perfection a better soil and climate than ours will, I believe, be proved by further experience, a fallacy.”

Mr. Howard, referring in his book to agriculture in general, seems to feel great pleasure in cutting

* This I have attempted to prove in almost every chapter of my pamphlet.

up *la petite culture* in Belgium and other countries, and also the habits of its occupiers. I am myself very partial to a farm of 200 or 300 acres, but *la petite culture* is indispensable in Belgium. Without *la petite culture* how would the dense population of the lower class be employed. In *la petite culture* three men are employed to the acre against one man in the *grande culture*.

At the same time, one acre of land cultivated by the *petite culture*, gives three times the produce of an acre cultivated in the *grande culture*, because a small farmer can grow a variety of crops, especially in garden vegetables, which a large farmer never dreams of cultivating.

That the small farmers, who are nothing more or less than labourers,* live very scantily: some, I dare say through necessity, others, perhaps, to save a little; but what they eat and drink is unquestionably wholesome food. If you were to offer those people the sausages that are made in London at 4d or 5d per pound, they would say that they would rather eat bread and butter milk of their own make, because they then know what they eat.

La petite culture would not perhaps exist in Belgium to so great an extent, but by the history of Belgium we know that two or three centuries ago

* This is quite true, and the poor creatures, I believe, work a great deal more than the regular daily labourers, because whatever extra work they do is to their own profit.

many of the large towns in Belgium had a population six times larger than at the present day ; a great portion of their population were engaged in branches of industry, which have long ago passed into the hands of other nations.

These labourers, or rather artisans, were driven into the country, where they were forced to cultivate a few acres of land for their existence.

It is also quite true that Belgium is over-populated, but speak to these people of emigration, they will say no, we have been born and bred here, in our humble little place, and we will die here.

The Belgian families of the lower class are much attached to each other, man to wife, and children to their parents ; and this of course constitutes a happy family, which is not to be despised.

If a daughter or son wishes to go out on a Sunday they will first ask permission of their father or mother, and tell them where they intend to go, and with whom they intend to associate ; in fact, so long as children are not married, they are under the control of their parents. Another characteristic in the lower class of the Belgian people is, that they will turn out clean and smart on a Sunday—indeed very different from a great majority of the working people in London, who stroll about the streets all Sunday in their unclean working clothes. I am now more an Englishman, I think, than anything else, after thirty years residence in this country ; still, as Mr. Howard seems to have been

delighted in cutting up our poor Belgians, I think I have a right to make a few remarks in their behalf, because they are a hard-working lot, honest, industrious, but rather too bigoted.

The author is happy to state that he is sufficiently acquainted with English society to know that few Englishmen entertain the wild notions with which a great portion of the continental gentry townsmen are imbued. French, Italian, Spanish, and even the Belgian townsmen, have a dislike for country people, and for everything that belongs to the country. Speak to them of practical and scientific agriculture, they make it appear that such matters *appartient exclusivement aux Paysans*, and is beneath their dignity. I am especially alluding to the younger class of society, whose aversion is so great to the country that they never think of spending a few summer days in a country place. They say, *comment, aller nous nuire parmi les Paysans. Point de théâtres, comment passer les soirées*; in fact, the town is their God and their Heaven. The elderly town gentry are equally averse to a country life, even those with an yearly income of £2000 or £3000, very seldom have a small country residence. The Estaminet café is their resort and amusement.

Those habits do not date from yesterday, but appears to have been inherited from the Latins, for in early ages men who aspired to distinction flocked to the large towns. Frenchmen especially

have preserved the habits and notions of the Latins.*

A French modern writer, with an air of enthusiasm, says, "De nos jours, encore, la campagne est pour nous une sorte d'exile." French literature indeed, up to the present day, has done very little to protect the cause of agriculture and the beauties of country life. La Fontaine is almost the only writer who has preserved some favourable feelings in behalf of a country life, and of matters connected with agriculture in general.

What a contrast between the two great neighbouring nations. While in France everybody was reading Voltaire and Crebillon, the English people read the Vicar of Wakefield and Tom Jones, romances, which all more or less dwell upon the beauties of nature, and the happiness of a country life.

Thomson sung the charms of a country life when the fields of France were deserted. The great Seigneurs having been attracted to the Court by Richelieu and Louis XIV. in 1730, and agriculture, with all its attributes, was entirely neglected.

The English national literature supplies us over

* A French townsman is exasperated when he comes in contact with a countryman, who is a match for him in elegance, refinement, and polite manners. In education the countryman is often his superior.

and over again with the manners, habits, and distinctive features practised in solitary life.

England is the country of descriptive poetry. Most of her poets have lived and sung the praises of the field. Pope wrote pastorals in the forest of Windsor.

The love of Englishmen for a rural life, does not date from to-day, it remounts to authentic historical origin, and is unique with their national character; and most all the races from which the English nation is formed, Saxon and Norman, had the instinctive tendencies for a country life.

I am somewhat deviating from my subject, but I am driven to it to uphold by a few remarks the virtues, the simple and rural habits of a great portion of the human race, against the absurd criticism of unreasonable men.

CHAPTER X.

LAND RENTS IN BELGIUM.

The Beet Root Sugar culture has brought the rents in Belgium, especially in those provinces where Beet Root is most extensively grown, to an exorbitant height; and rents have gradually risen since the last 25 years. This extraordinary rise in rents is of course the result of vast improvements in agriculture.

Unfortunately the profits derived from these improvements, are not equally divided between landlord* and tenant, but go almost exclusively into the pocket of the landlord. Leases being on short terms, the latter seizes the opportunity of taking advantage of every improvement which the tenant has endeavoured to introduce during the course of his lease.

The following statement of land-rents in Belgium, in 1869, has just reached the writer. They are as follows:—

	<i>s.</i>	<i>d.</i>		<i>s.</i>	<i>d.</i>
Antwerp . .	37	0	Liège . . .	43	0
Brabant . .	48	3	Limbourg . .	25	0

* The common populace have recently, I am sorry to say, given the landed proprietors in Belgium a nickname of "Sangsues:" this indeed is too vulgar.

	<i>s.</i>	<i>d.</i>		<i>s.</i>	<i>d.</i>
West Flanders .	44	0	Luxembourg .	18	3
East Flanders .	47	9	Namur . . .	27	6
Hainault . .	49	3			

Average rents for the nine provinces, 38*s* 5½*d* per English acre.

The increase in the value of land is not in proportion to the increase of rents.

The value of land at the present day in the nine provinces of Belgium, is as follows:—

	£	<i>s.</i>	<i>d.</i>		£	<i>s.</i>	<i>d.</i>
Antwerp . .	53	0	0	Liège . . .	62	0	0
Brabant . .	76	0	0	Limbourg . .	39	0	0
West Flanders	56	0	0	Luxembourg .	19	0	0
East Flanders	78	0	0	Namur . . .	46	0	0
Hainault . .	81	0	0				

Average value of farm land in the nine provinces of Belgium in 1869, £56. 12*s* 3½*d* per English acre.

The following statement is taken from the book “Continental Farming and Peasantry,” (Ridgway, Piccadilly), by Mr. James Howard, M.P.

“BELGIUM.

M. Leclerc, Brussels. “The average rent of farms in the various provinces in 1856 was:—

Per acre.				Per acre.			
<i>s.</i> <i>d.</i>				<i>s.</i> <i>d.</i>			
Antwerp	.	.	24 0	Liège	.	.	32 4
Brabant	.	.	32 0	Limbourg	.	.	19 10
West Flanders	.	.	21 8	Luxembourg	.	.	14 0

Per acre.			Per acre.		
<i>s. d.</i>			<i>s. d.</i>		
East Flanders .	34	0	Namur . . .	20	4
Hainault . .	35	2			

Average rent for the whole country, 26*s* 2*d.*

“Rents have increased considerably during late years in those parts where agricultural industry, chiefly sugar factories, have been established. There are in the neighbourhood of Brussels farms which are let at the rate of 58*s* per acre. The rents of small farms, for which there is much competition, range generally from 40*s* to 48*s* per acre.”

The following statement is also from “The Continental Farming and Peasantry,” (Ridgway, Piccadilly).

“BELGIUM.

“M. Leclerc, Brussels. Here follow the average selling prices of land in the various provinces in 1856.”

<i>£ s. d.</i>			<i>£ s. d.</i>		
Antwerp .	47	17 6	Liège . .	57	10 8
Brabant .	68	17 8	Limbourg .	34	18 6
West Flanders	50	19 2	Luxembourg	16	18 10
East Flanders	69	11 8	Namur . .	39	8 6
Hainault .	70	14 8			

Average for the country, £50. 14*s* 8*d.*

“On account of the situation, or of particular circumstances, land frequently reaches the value of £112. to £160. per acre.”

It will be seen that the statements of Mr.

Howard on the land rents and value of land in Belgium, are as far back as 1856, therefore fourteen years old ; statements of this kind would have better been appreciated by the agricultural public if they had been of a more recent date, but if the writer of "Continental Farming and Peasantry" had produced statements showing that land rents had risen 25 per cent since 1856, he could not have induced the English agriculturist to believe that Belgium remained stationary in agricultural industry during the last fourteen or twenty years.

The great advance of land rents in Belgium during recent years tells more forcibly than any argument, *ça va sans dire*, that without important improvement rents could not have augmented to that great amount. Common sense can judge and solve the question.

The writer of "Continental Farming and Peasantry" gives, with a few exceptions, a correct account of the mode and terms of letting farms in Belgium :—

BELGIUM.

"M. Leclerc, Brussels.—The land is always let on lease. The duration of the leases is generally nine years, with the option of withdrawal, at the end of three or six years ; but some intelligent landowners, are beginning to understand that it is to their interest to give longer leases, and there are already some of twelve years. Agricultural societies aim at this amelioration."

It is a very great mistake on the part of Mr.

Howard to think that the landowners* should for a moment entertain the notion of extending the terms of their nine years' lease. They would precisely do the reverse if it could be done with any degree of decency and propriety; because, then again they would have another chance in their favour of raising their rents more frequently; but as the landowners are already in bad odour, amongst their tenants, it is not to be supposed that they will take further ungenerous steps towards them.

The author is fully aware that amongst the most extensive Belgian landowners several are animated with the most generous and sensible feelings towards their tenants, such as Prince de Ligne, Baron D'Hoogvorst, the De Merode family, and many others; but it is the small landowners, which have not more than from £1000. to £2000. income (and even less) among whom are *Les Sangsues*,† of the small farmers.

* With the exception of ten or twelve of the largest landed proprietors, who are more generous and kind to their tenants, and who may, in many respects, be compared to the majority of English landed proprietors.

† The small landowners are also called by the rural populace *Les Parvenus*. This epithet was also enjoyed by Napoleon III. during his reign over France; and for the last few weeks he may have been privileged to enjoy at Cassel the epithet of *Napoleon le Tombé*. These remarks are not made offensively. The man who has given great prosperity to France is in this respect truly worthy of sympathy. Men often command sympathy, even when their misfortunes are caused by their own faults.

If agricultural societies are formed to introduce a better system of leases, namely, to extend the terms of leases, it is the work of tenants, it is they who precisely want longer leases, in order not to be exposed to a rise in their rent every nine years. Agricultural improvement societies should endeavour to abolish *le pot de vin*, the wine pot.* The day that a lease contract is concluded the tenant must pay 15 per cent extra of a year's rent, and this must be paid in silver, not in gold, *without which* the tenant will have no *luck*. This, I need not say, is a great superstition, and yet such has been the custom, especially in West Flanders, for many centuries.

Mr. James Howard, M.P., is not satisfied in criticising the Belgian populace, but dictates his ideas in a political point of view to the Belgian nation in general. In his book, "Continental Farming," he writes as follows:—

"Almost every Belgian is a firm believer in the superiority of *la petite culture* as a national system; but his arguments are generally based on considerations which are more æsthetic than economic, and his facts are derived from a comparison of, say, the Pays de Waes with the Polders. Such a comparison even, seems to us illogical; as the districts compared differ so widely in soil that there is no analogy between them. For instance, in the Pays de Waes a farmer can reckon upon getting a good crop of turnips by sowing after harvest: but in the Polders it is often very difficult to grow turnips at all. As

* This is particularly objected to by the poor small farmers.

for the poetry, the 'coquetterie,' and the other æsthetical attributes of *la petite culture*, so much admired by some writers, they ought not to be imported into the stern region of Political Economy."

A cette occasion l'auteur est encore une fois tenté à faire connaître à Mr. Howard qu'il est inutile de tâcher à prouver par ses arguments *Mal raisonnés* (illogical) que *la petite culture* n'est pas avantageuse à la Belgique.* La Nation Belge doit être à même de connaître ses intérêts mieux que toute individu. La *concentration* ne convient sous aucun rapport à la Belgique, et si une branche d'industrie plus qu'une autre, s'y oppose, c'est précisément celle de *l'industrie Sucrecine*.

Nous, une portion de la nation Belge, nous n'admirons pas *la petite culture* (au contraire) mais les circonstances de la Belgique nous commande comme un devoir National, de donner, notre support morale à *la petite culture*, ainsi qu' à la classe ouvrière en general.

If the author gives now and then a few passages in a foreign language it is because he cannot express himself with clearness and force in the English language, in which he is very deficient.

The author, on this occasion, wishes respectfully to acquaint his readers that it is upon the suggestion of several gentlemen to whom he has been known for years, that he has written a few pages on a

* All the arguments of recent writers to depreciate *la petite culture* are simply childish, and devoid of common sense.

subject which at the present moment is making some considerable sensation.

Should some little irregularity be observed in the arrangements of his topics, it is caused by the hurry in which it was thrown together, while his mind was constantly disturbed from having relations and friends, in the midst of the sad theatre of war.

CHAPTER XI.

INVESTMENT OF CAPITAL IN THE BEET ROOT SUGAR INDUSTRY.

Malgré the efforts of recent writers to induce the British farmer to grow Beet Root, he will not grow it, except, perhaps, after he has been convinced that for cattle food it is far superior to Mangel Wurzel : after being convinced of this, and that it can be grown at the same expense as Mangel, then he may very likely grow Beet Root instead of Mangel Wurzel.

But why should an enterprising farmer, with a little capital, not erect a factory to manufacture 6000 or 7000 tons of beet into sugar in a season. The expense of erecting a factory of this kind, building, machinery, and all the necessary utensils, will only cost £6000 ; this, with £6000 more to lay in stock for a season, will only amount to £12,000. I can only repeat that this small scale of working

this modern branch of industry, which is almost exclusively adopted in Belgium, pays better than any of the large establishments at present at work in Europe.*

The author is aware that any amount of convincing proofs of the immense emolument derived from this modern branch of industry will not induce the British farmer to embark in it, at least not as grower and manufacturer.

If capitalists do not come forward and embark in it on an extensive scale, it is a branch of industry which will go entirely into the hands of our continental friends, as they are determined, after having overcome every difficulty, to march forward as they have done, especially for the last few years.

Look at the gigantic size of the German Beet Root Sugar Factories. Mr. Scheutzenbach's, in Galicia, produces 70,000 cwt. of sugar every season, and includes within a circle of ten leagues a refinery and sixteen other establishments. The establishment of Waghäusel employs 3500 people in eight establishments, covering fourteen acres of ground, and employs a capital of 10,000,000 francs, or £400,000; in 1865, 1,340,000 cwt. of Beet Roots were manufactured in this establishment.

* In Germany also arrangements are made among a few enterprising farmers to erect sugar manufactories in districts where the land is very suitable for its cultivation, engaging themselves to supply a certain quantity of tons of Beet Root, and this in every instance has worked very well.

In Austria the extensive landowners have taken this modern branch of industry up very warmly. Prince Metternich, Prince Leichtenstein, Count Thun, and many others give every inducement to their tenants to become Beet Root growers, besides they have become themselves extensive growers, and have established manufactories, refineries, and distilleries, keeping large herds of cattle on the various refuses of the Beet Root.

In France also several sugar factories are on a large scale, working up from 30,000 to 60,000 tons of Beet. The factory of Mr. Le Franc, at Flavyle-Martel, works up about 40,000 tons of Beet Root during the season of about six months. A giant sugar manufactory will come into operation at Meaux (Seine-et-Marne), which will work up, it appears, 100,000 tons of Beet Root during the season.

However, in France there are about 150 sugar factories which do not work up more than from 6000 to 7000 tons during the season. These factories, on a medium scale, are conducted on the same principles as in Belgium.

The capital invested in the Beet Root Sugar industry at the present day in France is computed at 300,000,000 francs (£12,000,000) ; in Belgium it is computed at 40,000,000 francs (£1,600,000).

Belgium, it will be seen, is the largest Beet Root Sugar producing country in Europe, and this malgré its *petite culture* and poor soil.*

* During the last few years I have been inundated by

The author is surprised to find that capital is so freely coming forward in enterprises of exceedingly doubtful utility and safety ; such as mines in California and Australia, Draining Companies in Rio and Milan, Water Companies in Berlin and Amsterdam, Hotel Companies in almost every large town in Europe, and a long list of other companies all over the world, of which the shareholders know scarcely the names ; and yet, at our doors, there is an undeveloped branch of modern industry, more safe, more lucrative than any of those named, awaiting the attention of British capitalists.

correspondences from Belgium and the north of France on this sugar question ; but I took little notice of this correspondence, because I knew very little about Beet Root and its manufacture into Sugar, until lately, when several gentlemen who have known me ever since I was in this country thirty years ago ; and being a native of Belgium, they thought that I should write a few pages on a subject which, at this moment, was making some sensation. I hesitated, because I knew nothing of the subject ; and it may not be out of place here to state, that I am no practical agriculturist at all, as I never had an acre of land under my direct control, except in our garden grounds ; but I have been always an amateur agriculturist, observer, and a sympathiser of agriculture, and of a country life. If I call myself now Belgian agriculturist, it is no title of my own creation, but it is the creation of several gentlemen who have called me during a long series of years the Belgian agriculturist, and as such I must accept it.

CHAPTER XII.

SOCIAL AND MORAL BENEFITS DERIVED FROM
THE BEET ROOT SUGAR INDUSTRY.

The immense emoluments accumulating in the hands of growers and manufacturers of Beet Root Sugar in those parts of Europe where this modern branch of industry is firmly established, must necessarily produce its happy effects upon the surrounding population in a moral and social point of view.

Comfort and contentment is to be noticed in every district in Belgium and France, where this branch of industry is established. Already in France 250,000 people are enjoying those blessings. In Belgium also 50,000 men, boys, and girls engaged in the sugar factories are equally enjoying unusual comfort and happiness. In Belgium expert workmen in the sugar factories earn 4 francs per day, unexpert workmen 2 fr. 50 cents.; boys 1-50, and girls 1-40 per day. In France the same class of workpeople in the department Du Nord earn about the same wages as the workpeople in Belgium; in some other departments of France they may earn a trifle more.

The workpeople, without exception, are particularly fond of this kind of work, and it seems to

have a very good effect upon their health; indeed the nature of this occupation is very different from that of extensive mills and factories in large towns, which are all but healthy.

This branch of industry, being a combination of agriculture and manufacture, is of necessity, from its very nature, confined to the country; it consequently takes away from the younger class of people the dangerous inducement of flocking to large towns for employment, where they very often contract immoral habits, producing a disorderly and an unhappy life; while, on the other hand, the people in the sugar factories are in a very wholesome employment; besides, they have their little cottage in the country district near the factories, where rents are small compared to those of large towns. They are consequently comfortably and economically located, together with the advantages and pleasure of a happy country life.

CHAPTER XIII.

THE INTRODUCTION OF THE BEET ROOT SUGAR
INDUSTRY WILL CHECK EMIGRATION.

IF an equal number of people, such as are employed in France and in Belgium in the Beet Root Sugar industry, were employed in the same capacity in the United Kingdom, would not such employment be the certain and most effective means of checking emigration?

To encourage emigration is not, in the true sense of the word, either philanthropy or political economy, but precisely the reverse—that is, looking at the question in a moral point of view; but, looking at it in a *national, industrial and financial point* of view, can any one, after giving the subject his sober and earnest consideration, construe or trace any advantage to be gained by the country at large by exporting the “*Flower of Manhood*”—the stalwart sons of England, from their native land? No! Such men as these ought to be esteemed as a treasure to their country, and especially to Great Britain, if employment were found for them, and a proper use made of them.

In no other State of Europe is such encouragement given to emigration as in England and in the United Kingdom generally.

In other countries an increase in the population is looked upon with pride, and is justly considered the legitimate source and the sure forerunner of national prosperity and power. While upon this topic, it may be as well to ask why an equal inducement is not offered to that class of persons who infest the streets of great commercial cities and are a nuisance to society at large?

As with a nation so with an established business firm, every possible means should be used to promote the employment and retain the services of their own people, and where new fields of industry can be discovered, to prevent emigration and sustain the national prestige, it is obviously the bounden duty of every true Englishman to promote it to the utmost of his abilities.

The author desires it to be understood that he makes the above suggestions with all due respect and forbearance to the English nation.

CHAPTER XIV.

LAND RENTS OF THE UNITED KINGDOM, TOGETHER WITH OTHER ADVANTAGES IN FAVOUR OF THE BEET ROOT SUGAR INDUSTRY.

The author has taken considerable steps to ascertain if any authentic statement were before the public, giving the average value of land rents in Great Britain, and up to the moment of his pages going to press he has not obtained any authentic accounts on the subject; however, from private information, he has come to the conclusion that the average rents in the United Kingdom are about 28*s* per acre. This I must confess somewhat astonished me. What, Great Britain, with her grand and glorious agriculture, leasing her lands at least 25 per cent. lower than little insignificant Belgium with its *petite* culture?

If the tenant farmer of the United Kingdom do not make his fortune, or has not already made it, it is no fault of the landowners—(this last paragraph, however, is not a point the author wishes to discuss.) But their low rents tell unquestionably very favourably for going into competition with the foreigner to grow Beet Root Sugar.

Besides rents, as it appears, being 25 per cent. lower than in Belgium and many other parts of

Europe, fuel is cheaper, facilities of transport by land and water; manures, especially guano, can be obtained at a shade lower than on the Continent; labour is not higher, since high wages are now paid in the sugar districts on the Continent; machinery of a superior kind can be obtained in England cheaper than in many other parts of Europe.

The land, with its low rents, is besides better suited it appears than many other parts of Europe to grow Beet Root Sugar. Many other advantages may be in store to secure success to the sugar industry of the United Kingdom, of which I am not cognizant.

In terminating this short but most important essay, the author begs once more to express his doubts as to the willingness of the British agriculturist to grasp at this prolific branch of modern industry. This, however, is not consistent with the intelligent efforts and the scientific assistance brought to bear upon all questions affecting the economy of the agriculturist.

The author further permits himself to think, that the British tenant farmer has become too independent to deviate in the slightest degree from his usual modes of cultivating the soil; and in this indifference the author traces an abuse of the liberality and leniency shewn by the landowner.

CHAPTER XV.

SELECTION OF SEED TO GROW BEET ROOT
SUGAR.

This is one of the most important points connected with the sugar industry.

From the use of good or bad seed, the success or non-success of a sugar manufactory depends.

In Germany, especially, particular attention is paid to the cultivation of good seed. Several German scientific men of great renown have given this subject their earnest and best study, amongst others, Doctor Grouven and Doctor Ritthausen.

In France, M. Louis Vilmeran, a scientific agriculturist, has given this important point much attention.

In Silesia, the Baron Koppy has occupied himself since the beginning of this century in ameliorating the Silesian Beet Root seed.

A firm, extensively engaged in the sugar industry, has written as follows on this all-important point:—

“ Le choix de la qualité de la graine à employer est, comme on doit bien le supposer, un des points essentiels de la culture de la betterave. Le premier soin qu'on doit avoir c'est de n'employer que de la semence bien pure et appartenant toute à une même variété, et pour en être bien sûr il est indispensable que le cultivateur la récolte lui-même.

“ L'existence d'une fabrique de sucre peut dépendre de la qualité de la graine ; il est évident que le fabricant ne doit employer que celle qui lui fournira la plus grande quantité possible de sucre, il devra donc éviter les moins bonnes sous ce rapport, comme, par exemple, la bouteuse, qui portant est fréquemment cultivée dans le Nord ; se rappeler que les racines les plus grosses ne sont pas les plus riches en matière sucrée.

“ En Allemagne, il s'est formé des associations pour l'amélioration de la betterave, et les fabricants de ce pays obtiennent, proportionnellement, des quantités plus considérables de sucre non pas par des méthodes particulières, mais simplement par la qualité de betteraves qu'ils emploient, dont la richesse saccharine dépasse de 20 à 30 pour 100 celle des racines françaises. On sait d'ailleurs que la proportion des matières étrangères augmente à mesure que celle du sucre diminue.

“ Plusieurs cultivateurs allemands livrent au commerce des graines de betteraves d'une grande richesse saccharine ; nous citerons particulièrement M. Ferd. Knauer, de Grobers, près Halle, qui produit une variété dite impériale, dont il garantit la valeur en sucre à 17 pour 100. M. le docteur Grouven, qui dirige la station expérimentale de Tharand, affirme avoir obtenu des betteraves dont le jus titre au densimètre 10,774—10,775—10,717 et 10,800, et M. le docteur Ritthausen, de la station de Saarlautern, en Silésie, a annoncé des chiffres presque aussi élevés.

“ M. le baron de Koppy, à Khrain, en Silésie, qui l'un des premiers à fabriqué du sucre de betteraves, s'occupe, depuis le commencement du siècle, de l'amélioration de la variété désignée par le nom du pays qu'il habite, et est parvenu, par une culture suivie et rationnelle, à obtenir une race dont les racines, d'un poids tout à fait normal, ont une richesse saccharine très-remarquable et très-constante. Cette richesse serait de 9,4 à 10,3 de l'aréomètre de Baumé, correspondant à 15,5—16,2% de sucre d'après le polarimètre.

“ M. le docteur Koppy vend sa graine aux cultivateurs à

raison de 24 thalers (86 fr. 40 cent.) les 100 kilogrammes. M. Louis Vilmorin, ce savant agronome dont l'exactitude est bien connue, a obtenu des racines dont le jus frais marquait une densité de 10,878 ; et des graines qu'il avait envoyées à M. de Sauray ont produit des racines fournissant un suc couleur chocolat foncé, et marquant au densimètre 10,872 à la température de + 15 degrés centigrades ; or, 10,850 du densimètre correspondent à 11 Baumé, degré qui indique une richesse de 20 %. Mais M. L. Vilmorin avait obtenu un résultat encore plus extraordinaire, savoir des racines dont le jus marquait 16,910 au densimètre, ce qui correspond à 24 % de sucre.

“ Ces expériences nous prouvent que par le choix d'une bonne graine, on parviendra à produire des races constantes d'une richesse bien supérieure à celles des variétés qu'on emploie actuellement. C'est aux savants qui s'occupent de physiologie végétale, et aux expérimentateurs exercés à diriger leurs recherches, de manière à découvrir les conditions les plus avantageuses pour atteindre ce but.”

The author has not come forward as an instructor in the processes connected with the Beet Root Sugar : he leaves this task to practical men ; but on this very important point he will endeavour to explain the process of saving the seed for the culture of Beet Root Sugar.*

The botanical character of the Beet Root plant is a biennial plant.

As the Beet Root plant cannot stand the severe weather of winter, the plant, in October of its first year's course, is removed into cellars or other more

* In his next chapter he also explains briefly a very important process.

spacious places of this kind, where the plant is protected from frost.

The plant is placed perpendicularly, in sand and ashes* mixed, slightly moistened; and must be kept in this state until spring, when the plant is again brought to the open air, and planted in a piece of ground well prepared and made rich. The plants are planted at a yard square distance from each other.

When the plants have come into flower the different species are distinguished by their different colours, therefore those not belonging to the race which is intended to be cultivated must be removed. The seed plants come to maturity in Belgium and the north of France, in the latter part of September.

While my pamphlet was in the press, I called upon Mr. Gibbs, the seedsman of the Royal Agricultural Society of England, to see the various species of the six varieties of plants which are now cultivated on the Continent of Europe, namely:—

No. 1. The French or Belgian Sugar Beet.

No. 2. The Quidlinburg German Sugar Beet.

No. 3. The Silesian Beet.

No. 4. The Siberian Beet.

No. 5. The Imperial Beet.

No. 6. The Vigorous Beet.

* Wood ashes in preference to coal ashes.

Mr. Gibbs, with whom I had a little conversation on the Beet Root Sugar question, told me he had only one sort of Beet Root seed, and this I believe is the Imperial. Mr. Gibbs intends to have an assortment of the various species—and had forwarded an order that very day—but as almost everything coming from France was intercepted, he may not have an assortment for some time, except it were sent over *by balloon*.

The author is very serious in recommending the importation of the various sorts of seeds, which are much more numerous than the six varieties just enumerated.* He would take almost any steps to see a large collection of the various species; as he is willing to confess that he is, like many others in this country, a novice in most all the attributes of this modern branch of industry.

* Gentlemen, and amateur scientific agriculturists may wish to try experiments on a small scale, and be at a loss to know where or how to get the various species of seeds.

CHAPTER XVI.

TRANSPLANTATION OF THE BEET ROOT PLANT.

The experiments which have been recently made by Belgian and French agriculturists have been very successful in every instance. Five tons more Beet have been obtained per acre, besides the quality is superior, producing from two to three per cent more sugar—an acre, *semis en pépinière*, produces plant to supply fifteen acres for transplantation. The land to grow this plant for transplantation must be made very rich; Colza cake should be applied to the soil in liquid or in powder at the rate of at least £10 per acre. Farm-yard manure is often added to this, to the value of £4 per acre. The farm-yard manure should be ploughed in in autumn about four inches deep. The Colza oil-cake to be put on the land in January or beginning of February.

So soon as the land intended for this purpose can bear the horses, say at the beginning of March, one deep ploughing should be given; then, two or three days after, a cross harrowing, and five or six days after a second deep ploughing; then, in very few days, harrowing and rolling should be proceeded with (the weather permitting), in fact the land should be made like a garden plot.

The land should be sown by the 15th of March at the rate of at least 40 lbs. per acre, to be sown broad-cast (under no consideration in drills). One acre of Beet Root plants, sown in this mode, will supply sufficient plants to transplant 15 acres, as already stated.

As this operation takes place early in spring, when the weather is still very cold, a piece of land is always chosen that is more or less protected from the eastern and northern winds ; and if the season be very dry, a weak farm liquid is often applied to the plants, in order to stimulate the plants to grow up to the proper size required for transplantation by the 15th of May if possible. The plants should have attained the size of the thickness of a finger before being pulled, for transplantation. But as there are so many different sizes of fingers, it will be more systematic to say that the plants should have attained an average of five centimetres in circumference, before they are fit to be pulled for transplantation.

The plants should be pulled carefully without force, to prevent the roots from breaking at the thinner ends. The plants must be returned to the soil, that is transplanted, the same day that they have been pulled.

The following is the way in which the transplantation is done. I will explain it as well as I can :— the rows to be 18 inches apart, and about 12 inches distant in the rows ; a man with a wooden

implement, (composed of 2 poles about 30 inches high, with a handle to it, the lower parts of the 2 poles are of iron, and are in the shape of a Beet Root plant of about 10 inches in circumference, but gradually pointed), makes two holes at a time with great quickness, two or three boys follow with a lot of the young plants, and drop them in the holes, closing them at the same time with the foot ;* this is also done with great quickness.

The soil having become stiff by the trampling of the planters, a man follows with a rake to loosen the soil, and especially to adjust the soil round the plant, in order to be sure that the holes may be properly filled and closed, without which the plant will not take new life.

However it takes always two or three days before the plants begin to grow again. Six or seven days after the transplantation has been performed, it is necessary to go over the plantation, to see if there are no plants which have failed to assume new life. There are always some, perhaps one in twenty plants, which will not grow, the cause of which is that the plant has been too closely pressed in the soil, or to have been left too loose in its new *residence*.

The expenses of growing an acre of Beet Root plant for transplantation are considerable, and I have not yet been favoured with all the particulars

* This is done by boys of 14 or 15 years old, who are more suitable to do this kind of work than men, because it is done in a stooping attitude.

to be able to give a correct account of the precise expense; but to be sure not to be under the mark I will set it down at £30. per acre. As the acre grown in the *Pépinière* Nursery (as it may be called) supplies plants for the transplantation of 15 acres, it follows that the extra expenses to grow an acre of Beet Root by the transplantation plan are at the rate of £2. per acre.

Now let us see the advantages of growing the Beet Root on this new plan. In the first place we have an extra produce of 5 tons per acre, as already mentioned; in the next place it has been clearly ascertained that the Beet Root grown on the transplantation plan produces from 2 to 3 per cent. more sugar. Therefore the extra produce in weight and the extra produce of sugar derived from this new mode of growing the Beet Root Sugar, may be set down without exaggeration at £8. per acre, but to make the profits nett, the £2. of extra expenses must be deducted, and therefore the advantages gained are £6. per acre. I now ask myself again what shall we hear next of the *Plante Prodigeuse*?

The numerous experiments which have been made in Belgium and France have been made very fairly to ascertain the real merits and value of this new mode of cultivating the Beet Root plant. The experiments have all been made upon fields where the two systems have been contrasted fairly. The land having been prepared as usual, and the quantity and quality of manure also the same over the

whole field; of course if more work had been given to the preparation of the land, or more manure had been applied to that portion of the field intended for growing it on the transplantation plan, the experiments would not have been fairly tried.

Agriculturists all agree that no other cause can be attributed to the great success of this mode of growing the Beet Root plant than simply the effect of the seed having in the first instance been sown in a nursery plot of land, and afterwards been transplanted to another soil, and that the plant has enjoyed in two different soils all the proportions which are most advantageous to its nourishment and vigour. .

The experiments to which I have alluded were most all made by Belgian firms, who are largely engaged both in the growth and manufacture of the Beet Root. It is but fair that I should state here that the proprietors of these establishments are not very ready to give publicity to the results of their experiments.* Of all nations the Belgians are the most jealous of their industry. The Germans come next to the Belgians in that respect. Frenchmen are very different, as they feel generally a pride in giving publicity to experiments in which there is considerable merit (except when they intend to have their invention patented.)

* It is not to be expected that the result of their experiments can remain a secret, as the crop is not grown *in a sac*, but in the open field. The manufactural part cannot even be kept a secret.

During the last few years much publicity has been given in France to the Beet Root Sugar industry ; amongst others, a newspaper called "Journal des Fabricants de Sucre" has been published during the last four years ; also several works—"Guide pratique du Fabricant de Sucre," by N. Basset ; "Fabrication de Sucre de Betterave," by B. Durant ; "Traité de la distillation des Betterave," by A. Payen. The most interesting work—"Fabrication de Sucre"—is by M. F. S. Zoéga. Paris, 1868.

M. De Gasparin, a gentleman known all over Europe for his scientific researches in this Beet Root Sugar question, gives the result of an experiment made on the transplantation system, which is as follows :—

"M. de Gasparin a essayé ce mode de culture dans le midi et a obtenu jusqu'à 275,000 kilogrammes de betteraves sur un sol où, par la méthode ordinaire, il en récoltait à peine 20,000. Les conditions qu'il recommande pour obtenir ce résultat magnifique, sont : 1° de défoncer rapidement le terrain pour permettre aux racines un plus grand développement ; 2° d'y accumuler une grande quantité d'engrais. M. de Gasparin employait par hectare 200 mètres cubes de bon fumier et 1500 kilogrammes de tourteaux de colza ; 3° resserrer les plantes à 0^m.33 dans tous les sens ; 4° faire le semis sur couche et sous châssis, au commencement de janvier ; repiquer en avril avec du plant qui, à cette époque, a acquis la grosseur du doigt.

"Si ces résultats, que l'on peut appeler prodigieux venaient à se généraliser, ils arriveraient à substituer partout le repiquage aux semis sur place. Mais il semble difficile que ce

genre de culture puisse être pratiqué en grand, et l'on remarque que quelles que soient les précautions que l'on prenne, beaucoup de betteraves montent en graine, et, par conséquent, sont perdues pour le fabricant."

I will make no further remarks upon these extraordinary results, and will conclude my few pages by repeating my motto—"Beet Root Sugar is destined to play a great part in the industrial and commercial world."

APPENDIX.

During the month of November I was favoured with several letters from parties who take an interest in the Beet Root Sugar industry, amongst others, from Mr. James Duncan, which is as follows :—

“9, MINCEING LANE, LONDON, E.C.

4th November, 1870.

“E. F. De Man, Esq.,

“Sir,—Your letter and pamphlet have been received by me from Lavenham.

“Mr. Ponter, my manager at Lavenham, will show you the factory any day you like. The crop of Beet this year is not a large one, but the quality is excellent; the growth is increasing.

“Yours truly,

“JAMES DUNCAN.”

Mr. James Duncan is largely engaged as a Sugar Refiner in the city; and three years ago he established a Beet Root Sugar Manufactory at Lavenham, Suffolk, where he is at present converting weekly 400 tons of Beet Root into Sugar of a quality far superior to the Cane Sugar, and it appears that he is now able to compete with the large Beet Root Sugar manufacturers of France and Germany.

The following letter, from the Right Hon. T. F. Kennedy, will also be read with interest.

“DALQUHARRAN CASTLE, MAYBOLE, SCOTLAND,

17th November, 1870.

“Sir,—I beg leave to acknowledge the receipt of your letter of the 14th, on the subject of Sugar Beet.

"In reply I have to say that I do not know of any one in this part of the country who now grows it, except myself; but I think the district very suitable to it in respect of soil and climate, and it would also be favourable to a Sugar factory, cost being about 16s a ton, and abundance of it.

"Persons are very slow to enter on a new industry; but I am quite of opinion that the county of Ayr would suit the object as to which you write, if a capitalist chose to undertake it.

"I grow the Sugar Beet for milch cows and pigs, for which it is found very useful, and this year the roots of October, 1869, kept, *in good condition*, until September, 1870, which is a very great advantage for my purpose, but that is a very small and separate subject from the purpose of Sugar, which I should be glad to see undertaken.

"I am, Sir,

"Your very obedient servant,

"T. F. KENNEDY.

"Mons. E. F. De Man."

From this letter it appears that the soil and climate of some parts of Scotland are very suitable for the culture of Beet Root Sugar.

THE END.





